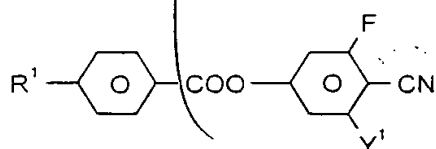


# Patent Claims

SUB  
A1

1. An electro-optical liquid-crystal display comprising  
5 a layer of liquid-crystal medium between two substrates with alignment layers on inside surfaces of each of said substrates;  
the liquid-crystal layer having a twist angle, from one substrate to the other, of 110°-360°;  
10 the liquid-crystal layer having a surface tilt angle of 2°-20°; and each of said alignment layers having a thickness of 3 nm-150 nm.
- 15 2. A display according to claim 1, at least one of said alignment layers has a layer thickness of 4 nm-60 nm.
3. A display according to claim 2, wherein the difference from 1 of the steepness of the electric-optical characteristic line, represented by the formula  $V_{90}/V_{10}-1$ , is half or less of the corresponding value of an otherwise identical display in which the layer thicknesses of each of  
20 the alignment layers is 100 nm.
4. A display according to claim 1, wherein the steepness of the electro-optical characteristic line  $V_{90}/V_{10}$  is 1.06 or less.  
25
5. A display according to claim 1, wherein the threshold voltage ( $V_{10}$ ) of the display is 1.20 V or less.
- 30 6. A display according to claim 1, wherein said liquid-crystal medium comprises one or more compound(s) of formula I



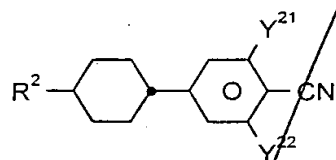
FOSTHO 2327E850

wherein

R<sup>1</sup> is alkyl having 1 to 7 carbon atoms, alkoxy having 1 to 7 carbon atoms, alkoxyalkyl having 2 to 7 carbon atoms, alkenyl having 2 to 7 carbon atoms or alkenyloxy having 2 to 7 carbon atoms, and

Y<sup>1</sup> is H or F.

7. A display according to claim 1, wherein said liquid crystal medium comprises at least one compound of formula II



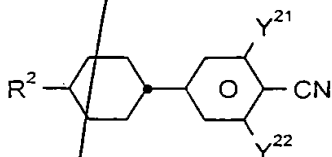
II

wherein

R<sup>2</sup> is alkyl having 1 to 7 carbon atoms, alkoxy having 1 to 7 carbon atoms, alkoxyalkyl having 2 to 7 carbon atoms, alkenyl having 2 to 7 carbon atoms or alkenyloxy having 2 to 7 carbon atoms, and

Y<sup>21</sup> and Y<sup>22</sup> are each, independently, H or F.

8. A display according to claim 6, wherein said liquid crystal medium comprises at least one compound of formula II



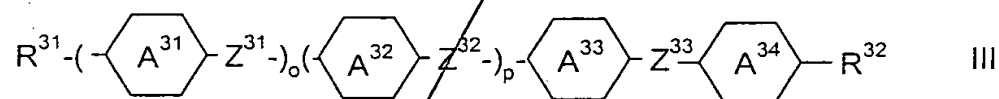
II

wherein

$R^2$  is alkyl having 1 to 7 carbon atoms, alkoxy having 1 to 7 carbon atoms, alkoxyalkyl having 2 to 7 carbon atoms, alkenyl having 2 to 7 carbon atoms or alkenyloxy having 2 to 7 carbon atoms, and

$Y^{21}$  and  $Y^{22}$  are each, independently, H or F.

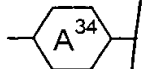
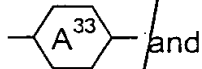
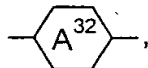
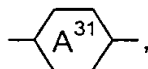
9. A display according to claim 6, wherein said liquid crystal medium comprises at least one compound of formula III



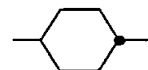
wherein

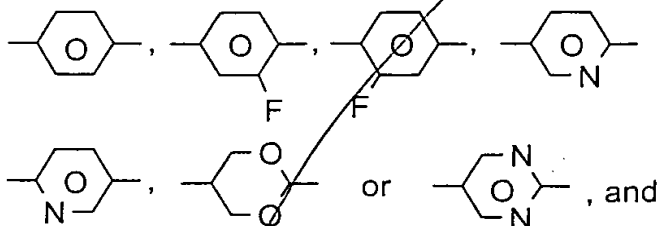
$R^{31}$  and  $R^{32}$  are each, independently of one another, alkyl having 1 to 7 carbon atoms, alkoxy having 1 to 7 carbon atoms, alkoxyalkyl having 2 to 7 carbon atoms, alkenyl having 2 to 7 carbon atoms, or alkenyloxy having 2 to 7 carbon atoms, and

$Z^{31}$ ,  $Z^{32}$  and  $Z^{33}$  are each, independently of one another,  $-\text{CH}_2\text{CH}_2-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{COO}-$  or a single bond,



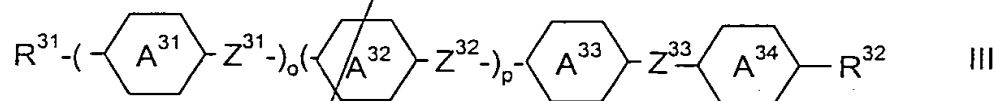
are each, independently of one another,





o and p, independently of one another, are 0 or 1.

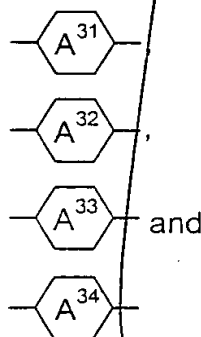
10. A display according to claim 7, wherein said liquid crystal medium comprises at least one compound of formula III



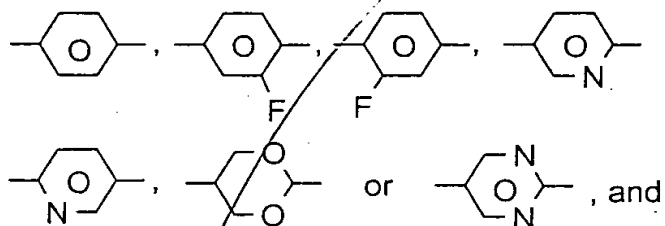
wherein

$R^{31}$  and  $R^{32}$  are each, independently of one another, alkyl having 1 to 7 carbon atoms, alkoxy having 1 to 7 carbon atoms, alkoxyalkyl, having 2 to 7 carbon atoms, alkenyl having 2 to 7 carbon atoms, or alkenyloxy having 2 to 7 carbon atoms, and

$Z^{31}$ ,  $Z^{32}$  and  $Z^{33}$  are each, independently of one another,  $-CH_2CH_2-$ ,  $-CH=CH-$ ,  $-COO-$  or a single bond,

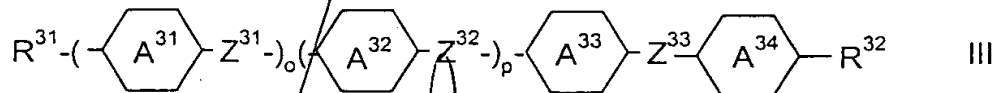


are each, independently of one another,



o and p, independently of one another, are 0 or 1.

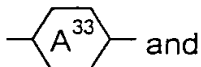
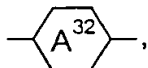
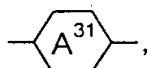
11. A display according to claim 8, wherein said liquid crystal medium comprises at least one compound of formula III



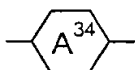
wherein

$R^{31}$  and  $R^{32}$  are each, independently of one another, alkyl having 1 to 7 carbon atoms, alkoxy having 1 to 7 carbon atoms, alkoxyalkyl, having 2 to 7 carbon atoms, alkenyl having 2 to 7 carbon atoms, or alkenyloxy having 2 to 7 carbon atoms, and

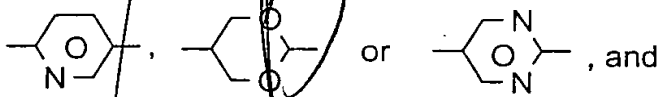
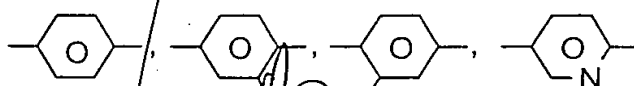
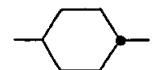
$Z^{31}$ ,  $Z^{32}$  and  $Z^{33}$  are each, independently of one another,  $-CH_2CH_2-$ ,  $-CH=CH-$ ,  $-COO-$  or a single bond,



and



are each, independently of one another,



o and p,

independently of one another, are 0 or 1.

12. In a method of displaying information using an electro-optical liquid-crystal display, the improvement wherein said display is one in accordance with claim 1.

Add  
A2